A SYSTEM DYNAMIC MODEL FOR DECISION SUPPORT SYSTEM IN LEAN CONSTRUCTION

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This study is dedicated to my beloved parents who have always loved me unconditionally and whose good examples have taught me to work hard for the things that I aspire to achieve.

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ABSTRACT

Construction waste is considered a major contributor of total construction cost. Considering this major cost, identifying the underlying resources that contribute to construction cost is the foremost step toward providing sustainable and practical method to manage construction waste. Due to the dynamic nature of construction projects, any financial decision taken in the project has substantial effect in subsequent phases of construction. Therefore, careful management of construction cost can significantly improve overall project effectiveness. Thus, capturing the dynamic relationships between different key parameters of construction cost is an indispensable necessity. Regarding construction costs, the use of system dynamic modeling enables constructional industrialists to manage their projects more efficiently with respect to waste management. This thesis proposed a system dynamic model to deal with the complexities, interrelationships, and dynamics of waste management on construction industries. The dynamic model is constructed by Vensim PLE software to represent the weekly budget rate, construction budget, and scheduled plans of a conventional construction project. The proposed model is also used to investigate different scenarios to adopt firm policies in construction industry. The obtained results are also evaluated and compared in terms of cost and time. The results of this research indicates that the labour has the most significant impact on increased construction budget, cost incurred by waste, and weekly change in budget.

ABSTRAK

Sisa pembinaan dianggap sebagai penyumbang utama kepada kos pembinaan keseluruhan. Oleh yang demikian, sumber yang berkaitan dengan kos pembinaan harus dikenalpasti dalam menentukan kaedah yang praktikal dan lestari bagi mengurus sisa pembinaan. Keputusan berasaskan kepada faktor kewangan akan memberi impak kepada fasa pembinaan yang seterusnya memandangkan keadaan projek pembinaan yang bersifat dinamik. Pengurusan kos pembinaan yang berkesan akan memberi kesan yang positif kepada keseluruhan projek pembinaan. Oleh itu, hubungan dinamik antara parameter kos pembinaan adalah sangat diperlukan. Penggunaan model sistem dinamik dapat membantu pihak industri untuk menguruskan projek mereka dengan lebih efisien terutamanya dalam aspek pengurusan sisa pembinaan. Kajian ini mencadangkan model sistem dinamik bagi menangani kerumitan, hubung jalin dan pengurusan sisa pembinaan yang dinamik dalam sektor pembinaan. Model dinamik tersebut telah dibina dengan menggunakan perisian Vensim PLE dan ia mengambilkira kadar bajet mingguan, kos pembinaan, dan jadual pembinaan yang konvensional. Model yang dicadangkan ini juga telah digunakan untuk mengkaji senario berbeza berdasarkan kepada polisi industri pembinaan sedia ada. Keputusan kajian telah diperiksa dan dibandingkan terhadap faktor kos dan masa. Hasil kajian ini mendapati faktor buruh akan memberikan impak yang paling signifikan terhadap kenaikan kos pembinaan, kos sisa pembinaan dan perubahan bajet mingguan.